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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,950	03/19/2004	Christine Konradi	04843/120003	8080

21559 7590 12/04/2007

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EXAMINER	
SALMON, KATHERINE D	
ART UNIT	PAPER NUMBER
1634	

NOTIFICATION DATE	DELIVERY MODE
12/04/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentadministrator@clarkelbing.com

Office Action Summary	Application No.	Applicant(s)	
	10/804,950	KONRADI ET AL.	
	Examiner	Art Unit	
	Katherine Salmon	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 39-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-2, 39-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/06/2007 has been entered.

2. Claims 3-38 have been cancelled. Claims 1-2 and 39-41 are rejected as necessitated by amendment or reiterated. Response to arguments follows.

3. This action is NONFINAL.

Withdrawn Rejections

4. The rejection of the claims under 35 USC/112 Enablement has been withdrawn.

Reiterated Rejections and Rejections Necessitated by amendment

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-2 and 39-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-2 and 39-41 are unclear over the phrase "a microarray consisting of a solid support onto which an array of at least two nucleic acid molecules are bound." The metes and bounds of the claims are unclear because the "consisting" language could be to limit the number and type of nucleic acid molecule present on the array, however, the claim can be more broadly interpreted to a microarray consisting of a solid support onto which an array comprises. Therefore the claim is more broadly interpreted as an array comprising any number and types of probes. This interpretation of a broader array is validated by the fact that Claim 2 encompasses comprising language. The metes and bounds of the claims are unclear because it is not clear if the limiting language of "consisting" is actually meant to limit the array to particular number and types of nucleic acid probes.

Claims 1-2 and 39-41 are unclear over the fragments of at least 15 nucleotides which encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain. It is unclear how 15 nucleotides "encodes" a polypeptide.

Claims 40-41 are unclear because Claim 1 is drawn to probes which are at least 15 nucleotides in length. Claim 40 is drawn to claims which are at least 10 nucleotides in length. It is unclear if the probes, therefore, are at least 15 or are at least 10 nucleotides in length.

Claim Rejections - 35 USC § 112-Written Description

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1- 2 and 39-41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1 is drawn to a microarray consisting of a solid support onto which an array of at least two nucleic acid molecules are bound, 90% of which are either: a) nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain said polypeptides being naturally coded for by a nuclear gene or fragments of a which are at least 15 nucleotides in length and are hybridizable array elements. Claim 2 is drawn to the microarray of claim 1 wherein array comprises a nucleic acid molecule encoding a polypeptide selected from ATP synthase, F1 complex, O subunit; ATP synthase, F0 complex, d subunit; ATP synthase, F0 complex, c3 subunit; ATP synthase, F1 complex, gamma polypeptide 1; and ATP synthase, F0 complex, subunit F. Claim 39 is drawn to the microarray of claim 1 wherein the microarray comprises fragments of at least 40 nucleotides. Claim 40-41 define the length of the probes.

Claims 1-2 and 39-41 are drawn to a broad genus of nucleic acid molecules. Claims 1 and 39-41 are drawn to any fragment of at least 15 nucleotides, at least 40 nucleotides, at least 10 nucleotides, or at least 25 nucleotides that are nucleic acid

molecules that encode nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain.

The specification discloses genes encoding polypeptides that function in oxidative phosphorylation in mitochondrial complex I, II, III, IV, and V (Figure 1). The specification asserts that changes in gene expression was observed in a gene encoding a component of mitochondrial respiratory complex I, NADH dehydrogenease; a decrease in one gene encoding a component of complex IV, cytochrome c oxidase, and a decrease in 5 genes encoding components of complex V, ATP synthases (p. 30 lines 5-9). The specification discloses lists of genes in tables with associated GenBank Accession numbers.

However, the specification does not describe which fragments of nucleic acids are critical for functionality. The claims broadly encompass any 15 mer nucleic acid fragments which encodes polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain which encompasses variants, mutants and homologs. Although the specification provides examples of genes the specification does not expressly define specific structural limitations for the broadly claimed nucleic acids. For example, the specification has not taught what makes or identifies a sequences a nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain or what features would identify a 15 nucleic acid sequences as such and thus the claims encompasses sequences not described by the specification.

The specification further does not describe 15 mer fragments which encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain. The

specification has not described the critical structure and therefore it is unclear which 15 nucleotides are necessary to encode.

The claims encompass nucleic acids defined by Genbank accession numbers which can be update and would therefore comprise any nucleic acid variant of any size of at least 15 mer or at least 40 mer, fragments of the sequences presented. The claims would encompass updates to the Genbank accession numbers could have variants, which include nucleotide substitutions, additions, deletions, translocations, and truncations.

For example, Accession No. D26599 (Table 4) was submitted on 11/9/1994, but the sequences has had an update to its sequence on 8/1/2006. As shown in the NCBI Blast, the update is not identical to the first submission. The first submission has a string of Ns as shown in the alignment of the two submissions:

```
Query: 661 agggaacnnnnnnnngatgggctcctttannnnnnnctactcttttcaggcgcactcttg 720
           |||||||         ||||||||||||||         ||||||||||||||||||||||
Sbjct: 661 agggaacttttttttgatgggctcctttatttttttctactcttttcaggcgcactcttg 720
```

Therefore the accession number can include changes to the sequences which could include substitutions, additions, deletions, translocations and truncations. The specification has not described which nucleic acids are critical for functionality. Therefore the artisan would not be able to determine which nucleic acids are encompassed by the claims because it is unclear which nucleic acids retain functionality. Therefore the claims encompass fragments of nucleic acids which are mutants, variants, and homologs but which have not clear description in the specification. Because the critical regions are not defined by the specification, the

specification has not described enough species such that the artisan would be able to determine which nucleic acid fragments are encompassed by the broad claim language.

The art discloses that there are nucleic acid changes in nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain which effects function. DiMauro et al. (New England Journal of Medicine 2003 Vol. 348 p. 26) teaches that mutations in mtDNA can affect specific proteins of the respiratory chain or the synthesis of mitochondrial proteins as a whole by mutations or deletions (p. 2660 1st column). Therefore the art shows that deletions alter the nucleic acids such that they do not function. However, it is not predictable which changes will affect function and therefore there is no clear description in the art which nucleic acids are critical for function.

While the specification provides a list of some genes (p. 30 and Tables 1-4), the specification provides insufficient written description to support the broad genus encompassed by the claims. Though this list of genes describes examples of species in the genus, it does not represent an adequate representation of all possible species in the genus. The species described in the specification are examples of genes encompassed by complex I, II, III, IV and V, however, the specification does not describe any relevant fragments of these genes. Therefore the specification describes relevant identifying characteristics of sequences such that complete genes of the complex I, II, III, IV, and V are known, however, the description has not provided guidance to the relevant identifying characteristics of 15 nucleotide in length fragments

of these genes. The specification has not provided guidance as to which nucleotides are essential to be defined as fragments of complex I, II, III, IV, and V.

Absent a written description, the specification fails to show that the applicant was "in possession of the claimed invention" at the time the application for the patent was filed. The genus of nucleic acids encompassed by the claim language is a large and variable genus and reads on any 15 mer which can encode any part of the polypeptide of complex I, II, III, IV, or V of the mitochondrial respiratory chain. The specification only discloses a selected number of species, which is insufficient to show possession of all attributes and features of all species within the genus which includes full length full length genes, mutants, variants, and homologs of 15 mer fragments of nucleic acids which encode any part of the polypeptide of complex I, II, III, IV, or V of the mitochondrial respiratory chain. Thus one skilled in the art cannot reasonably conclude that applicant had possession of the claimed 15 mer nucleic acid fragments encompassing mutants, variants, and homologs at the time the instant application was filed with respect to claims 1- 2 and 39-41.

Vas-Cath Inc. v. Mahurkar, 19 USPQ2d 1111, makes clear that "applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession *of the invention*. The invention is, for purposes of the 'written description' inquiry, *whatever is now claimed*." (See page 1117.) The specification does not "clearly allow persons of ordinary skill in the art to recognize that [he or she] invented what is claimed." (See *Vas-Cath* at page 1116.)

The skilled artisan cannot envision the detailed chemical structure of the encompassed nucleic acid fragments.

Vas-Cath Inc. v. Mahurkar, 19 USPQ2d 1111, makes clear that "applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention." (See page 1117). The specification does not "clearly allow persons of ordinary skill in the art to recognize that [he or she] invented what is claimed." (See page 1116).

Finally, *University of California v. Eli Lilly and Co.*, 43 USPQ2d 1398, 1404, 1405 held that:

To fulfill the written description requirement, a patent specification must describe an invention and do so in sufficient detail that one skilled in the art can clearly conclude that "the inventor invented the claimed invention." *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (1997); In *re Gosteli*, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989) (" [T]he description must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed."). Thus, an applicant complies with the written description requirement "by describing the invention, with all its claimed limitations, not that which makes it obvious," and by using "such descriptive means as words, structures, figures, diagrams, formulas, etc., that set forth the claimed invention." *Lockwood*, 107 F.3d at 1572, 41 USPQ2d at 1966.

An adequate written description of a DNA, such as the cDNA of the recombinant plasmids and microorganisms of the '525 patent, "requires a precise definition, such as by structure, formula, chemical name, or physical properties," not a mere wish or plan for obtaining the claimed chemical invention. *Fiers v. Revel*, 984 F.2d 1164, 1171, 25 USPQ2d 1601, 1606 (Fed. Cir. 1993). Accordingly, "an adequate written description of a DNA requires more than a mere statement that it is part of the invention and reference to a potential method for isolating it; what is required is a description of the DNA itself." Id. at 1170, 25 USPQ2d at 1606.

Accordingly, the specification does not provide written description of the invention of claims 1-2 and 39-41.

Response to Arguments

The reply traverses the rejection. The reply asserts that it is not necessary for the nucleic acids or the polypeptides encoded by the nucleic acids to retain any specific biological activity (p. 5 last paragraph and p. 6 1st paragraph). The reply asserts that nucleic acids only must be capable of hybridizing to an appropriate test nucleic acid when applied to the microarray (p. 6 1st paragraph). The reply asserts that identifying a known class of genes merely by class name or GenBank number is sufficient to identify the sequences for purposes of written description (p. 6 last paragraph). The reply points to Flakner and respond that the applicant is not claiming the nucleic acid sequences themselves (p. 6 last paragraph). The reply asserts that the microarray claimed do not recite variants, mutants, or homologues but only nucleic acids which encode polypeptides of the mitochondrial complexes of such nucleic acids which are hybridizable array elements (p. 7 last paragraph).

These arguments have been fully considered but have not been found persuasive.

The argument assert that it is not necessary for the nucleic acids to retain any specific biological activity and that it's the hybridization of the nucleic to appropriate test nucleic acids which defines the function. However, the nucleic acids are not defined by any hybridization conditions. There is no clear association between structure and function in the claim language. The specification has not described the hybridization conditions and therefore have not defined the critical nucleic acids needed to hybridize to the target elements and encode a polypeptide of complex I, II, III, IV, or V. Though the skilled artisan can design probes to hybridize to targets, there is insufficient

guidance to design probes that maintain the function of encoding a polypeptide of complex I, II, III, IV, or V.

The response cites Falko-Gunter Falkner vs. Inglis, 448 F.3rd, 1357, Federal Circuit as stating that sequence information is not required to be present in the specification to describe the invention. However, the facts of this case are clearly distinct from those herein. In the cited case, it was determined that it was sufficient to refer to a gene only by the gene name since the gene was well known in the art and the particular nucleotide sequence of the gene was not critical to the claimed invention. In contrast, in the present situation, the claims are drawn to fragments of specific genes. The specification has not defined which are the critical nucleic acids needed to be defined as nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V. Therefore, the two cases differ in the fact that in the Flakner case the sequence of the gene did not effect the invention, however, in the present case, the sequence would effect the invention because the claims encompass a large number of nucleic acid fragments including mutants, variants, and homologs of the claimed genes. The specification has not adequately described this genus of nucleic acids therefore the claims encompass a large number of sequences without any guidance in the specification as to which sequences would be considered to retain functionality.

The instant claims broadly encompass variants, mutants and homologs however, the specification has not identified the critical nucleic acids to retain functionality. Therefore, the skilled artisan would not be able to determine which 15 mer fragments are encompassed by the genus of a fragment encoding a polypeptide of complex I, II,

III, IV, and V. DiMauro et al. teaches that altered genes with large deletions can alter function. Therefore there is no guidance that fragments with large deletions would encode a polypeptide of complex I, II, III, IV, or V even though it would share structural identity.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-2, 40-41 are rejected under 35 U.S.C. 102(b) as being anticipated by Affymetrix Human Genome U95A array (Affymetrix Product Catalog January 2001) and by the Affymetrix Website (www.affymetrix.com).

With regard to Claims 1-2, 40-41 the Affymetrix U95A Gene Chip discloses: probe 34811_at (GenBank Accession No. U09813); probe 35760_at (GenBank Accession No. AF087135); probe 40134_at (GenBank Accession No. AF047436); probe 37029_at (GenBank Accession No. X83218); and probe 40115_at (GenBank Accession No. D16562). These probes are from the same GenBank numbers as the genes listed in Table 3 for the genes of Claims 1,2. Therefore the Affymetrix U95 gene chip encompasses all the limitations of the claims.

With regard to Claims 40-41, the Affymetrix U95A Gene Chip discloses arrays which comprise at least 25 nucleic acid molecules.

Response to Arguments

The reply traverses the rejection. The reply asserts that the array cited comprises mitochondrial energy metabolism genes, however, the array the not comprise the limitation of at least 90% mitochondrial energy metabolism genes (p. 8 1st full paragraph). The reply asserts that the amendments to the claims to a microarray "consisting" limits the claims to arrays with only at least 90% mitochondrial energy metabolism genes (p. 8 last paragraph).

These arguments have been fully reviewed but have not been found persuasive.

The reply asserts that the claimed microarray is limited to an array consisting of 90% fragments of nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain. However, the claims can broadly encompass a much larger number and types of nucleic acid molecules. Claim 1 is drawn to a "microarray consisting of a solid support onto which an array of at least two nucleic acid molecules..". This is being interpreted as a microarray which consists of a solid support which comprises an array of nucleic acid molecules. Therefore the language of "consisting" is not limiting the array of nucleic acid molecules. Claim 2 is also drawn to an array which "comprises". The claims therefore encompass any array which comprises nucleic acid molecule fragments which encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain as taught by the Affymetrix chip.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 39 rejected under 35 U.S.C. 103(a) as being unpatentable over Affymetrix Human Genome U95A array (Affymetrix Product Catalog January 2001) and by the Affymetrix Website (www.affymetrix.com) in view of Hogan (US Patent 5541308 July 30 1996).

The Affymetrix U95A Gene Chip discloses: probe 34811_at (GenBank Accession No. U09813); probe 35760_at (GenBank Accession No. AF087135); probe 40134_at (GenBank Accession No. AF047436); probe 37029_at (GenBank Accession No. X83218); and probe 40115_at (GenBank Accession No. D16562).

These probes are nucleic acid molecules from complex I, II, III, IV, or V of the mitochondrial respiratory chain.

However, Affymetrix does not teach 40 nucleotides probes.

Hogan et al. teaches the design of probes to amplify the 16S region of bacteria. Hogan et al. teaches, "while oligonucleotide probes of different lengths and base composition may be used, oligonucleotide probes preferred in this invention are between about 15 and about 50 bases in length" (see Column 10, lines 13-15

Therefore it would have been prima facie obvious at the time of the filing of the invention to select any number of probe lengths for the design of the microarray including 40 nucleotides in length. The ordinary artisan would have been motivated to design probes between 15 and about 50 bases in length because as taught by Hogan et al. this length of probe can be used for detection.

Conclusion

10. No claims are allowed.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine Salmon whose telephone number is (571) 272-3316. The examiner can normally be reached on Monday-Friday 8AM-430PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Katherine Salmon
Examiner
Art Unit 1634

/Jehanne Sitton/
Primary Examiner
11/20/2007